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Tree Disease Costs Millions Per Year

Foresters have known for some time that fusiform rust is causing a lot of damage in southern forests, but it took a team of scientists at the Southeastern Forest Experiment Station to say just how much. The team found that the disease is costing at least $28 million each year, based on 1972 prices.

Fusiform rust attacks young southern pines, causing swellings called galls on tree stems and trunks. Trunk galls, which are the most serious, either kill or seriously deform the tree. Forestry practices designed to improve tree growth, such as site preparation and fertilizer application, increase incidence of rust.

Forest Surveys

Slash and loblolly pines, the favored species for planting in the South, are highly susceptible to fusiform rust. In the most recent statewide surveys of forests in South Carolina, Georgia, and Florida trunk galls on trees of these species were tallied. Results showed that infection of both species was considerably higher in plantations than in natural stands.

The high rate of infection in plantations is particularly troub-

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Increasing Songbirds on Campgrounds

Glimpsing the brilliant blue of an indigo bunting or hearing the flutelike notes of a wood thrush can greatly enrich the pleasures of camping in the southern Appalachians. Opportunities for such sights and sounds in forested campgrounds can be increased by manipulating the vegetation on the area. The more shrubbery provided for nesting sites and cover in the undergrowth, the larger the overall population of breeding birds will be. The more diverse the mixture of evergreen and hardwood foliage in the forest canopy, the greater the variety of bird species will be.

These and other observations helpful to campground managers in the southern Appalachians were made by wildlife researchers of the Southeastern Forest Experiment Station in Blacksburg, Virginia, and Clemson, South Carolina. Their inventories of bird populations indicate that the density and diversity of songbirds will be greatest when campgrounds are developed on better forest sites in stands with a mixed canopy of conifers and hardwoods. On these sites, maintaining the undergrowth is

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Songbirds such as the wood thrush are attracted to campgrounds with a mixture of conifers and hardwoods.

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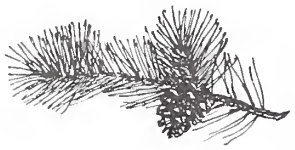
ling because large investments are required to establish plantations. Planted stands are often on the most productive sites, and are usually given the best care. Losses in plantations, therefore, tend to discourage forestry investors.

In the area surveyed, some 800 million slash and loblolly pines were found to have fusiform rust stem infections. The highest percentages of infection were in a zone across central Georgia, where more than 40 percent of the planted slash pines were attacked.

Financial Impact

Since many trees with trunk infections can be made into pulpwood, an infected tree cannot be regarded as a total loss. Estimating the annual dollar impact of the disease was the job of an economist assigned to the study team. Based on 1972 timber values, he figured the annual loss to fusiform rust stem infections to be $28 million for the entire South. This amount includes no allowance for young pines killed before they reach salable size. The $28 million is therefore regarded as a conservative figure.

Additional information about rust survey results and the economic analysis are contained in a recent article in the JOURNAL OF FORESTRY. Copies of the article are available from the Southeastern Forest Experiment Station, P. O. Box 2570, Asheville, N. C. 28802.



Heavy damage by fusiform rust in a 14-year-old slash pine plantation.

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the only management practice necessary.

On areas where either conifers or hardwoods predominate, birdlife can be increased by opening the canopy to encourage undergrowth. Variety should be maintained by locating roads, campsites, and picnic tables so that the less abundant components of the canopy are not removed. On open, park-like areas with extensive grass cover, shrubs should be planted in clumps to provide nesting sites.

Details of the study are available in a recent article in the *Journal of Forestry* entitled "Bird Density and Diversity as Related to Vegetation in Forest Recreational Areas." The authors are Robert G. Hooper, Hewlette S. Crawford, and Richard F. Harlow. Reprints are available on request from the Southeastern Forest Experiment Station, P. O. Box 2570, Asheville, North Carolina 28802.

Forecasting Yields

Equations for predicting characteristics of loblolly and shortleaf pine plantations in the highlands of Tennessee, Alabama, and Georgia have been developed by Glendon W. Smalley and Robert L. Bailey of the Southern Forest Experiment Station to help landowners decide how to manage over 360,000 acres of pine growing in that area.

With the equations, tables were produced which show number of surviving stems per acre, basal area, average tree height, and cubic-foot yields in eight volume categories. This information was tabulated by diameter class for broad ranges of planting densities, site indexes, and ages 10 to 40 years.

Smalley and Bailey derived the equations and tables with samples from 302 loblolly and 104 shortleaf plantations. The

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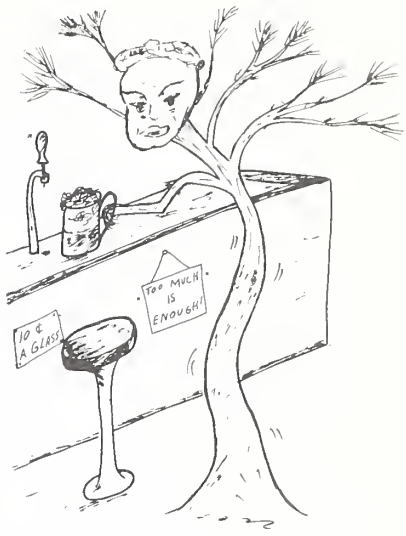
Are Trees Becoming Problem Drinkers?

Trees have an excellent record for controlling erosion and reducing surface runoff that can cause flooding. Furthermore, their litter and roots improve the soil while their trunks are producing valuable timber. They do such a good job that foresters have been inclined to overlook their weaknesses.

When the South's major worry about water was flooding, that attitude was reasonable, but now foresters are being forced to acknowledge that their charges sometimes have a problem. Researchers at the Southeastern Forest Experiment Station have found that trees are heavy drinkers. And some are worse than others in this respect.

The amount of water a forest produces for man is equal to rainfall minus two types of losses. Some water evaporates from the surface of the ground or from the surfaces of plants on which it falls. In addition, plants take in water through their roots and pass it through their leaves in a process called transpiration. The difference between rainfall and evaporation plus transpiration replenishes ground water and furnishes streamflow. Man depends upon this residual for his needs.

For some years, USDA Forest Service scientists at the Coweeta Hydrologic Laboratory in western North Carolina have been measuring changes in streamflow from watersheds whose timber stands were altered. They find that clearcutting native hardwood stands increases streamflow by from 8 to 18 area-inches the first year after cutting. As a new crop of trees grows, it uses progressively more water, and when the new hardwood stand reaches 15 to 30 years of age, it uses water at the maximum rate.



This rate can be reduced by thinning. Through a system of thinning and judicious clearcutting, 13,000 to 55,000 additional gallons of water per acre can be made available to man each year. And the bulk of this extra water is produced in late summer and fall, when streamflow is normally lowest and the need for water is greatest.

When it comes to drinking, the scientists find that pines are worse offenders than hardwoods. Pines have more leaf surface exposed to intercept rain and to transpire water than do hardwoods. Near Coweeta, mature white pines have been intercepting twice as much water per year as mature hardwoods. When white pines are 16 years old, they use over 200,000 gallons more water per acre per year than mature hardwoods in that area.

As in hardwood stands, management in pine stands can reduce annual water consumption. Wide spacing, frequent thinnings, and proper choice of sites

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On many sites in the South pines grow faster than hardwoods, but they also use more water.

South Doubles Pulpwood Production Since 1960

Pulpwood production in 12 Southern States totaled 47.1 million cords in 1973, an increase of 6 percent over 1972. Since 1960, the South's pulpwood production has doubled and currently amounts to 66 percent of the Nation's domestic total.

Major increases in output occurred in Georgia, Louisiana, Mississippi, South Carolina, Texas, and Virginia. Arkansas was the only Southern State reporting a decline, 1 percent below 1972 production. Georgia led with over 7.8 million cords, followed by Alabama with almost 7.2 million cords. These two States reported nearly one-third of the South's total production. Taylor County, Florida, reported the largest county production with over 247,000 cords.

Increased use of plant byproducts, primarily from sawmill and veneer plants, accounted for almost two-thirds of the increase of 2.8 million cords. Roundwood from hardwoods and softwoods accounted for the remainder. Byproducts from chipping plants amounted to 91 percent of the output of residues, with over 80 percent coming from softwood.

Pulping capacity of the 111 southern mills increased 5 percent to 92,255 tons per day in 1973. More than two-thirds of the increase was from expansion and modernization of existing facilities, while four new mills began operation.

These and other findings are contained in a new bulletin titled "Southern Pulpwood Production, 1973." The report was compiled by the USDA Forest Service in cooperation with the American Pulpwood Association, Cumming, Georgia. Copies are available from the Southeastern Forest Experiment Station, P. O. Box 2570, Asheville, North Carolina 28802, or from the Southern Forest Experiment Station, 701 Loyola Avenue, New Orleans, Louisiana 70113.

Midsouth Dominates Veneer Industry

Softwood plywood is now one of the major industries in the Midsouth. In 1972, five of the top eight softwood plywood producing States in the Nation were located in the Midsouth, and Louisiana passed California to become the third largest producer of plywood in the country.

Veneer manufacturing was once important to the South primarily as a hardwood industry, but the hardwood veneer industry has steadily declined in both

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A monoculture built around a single species, such as this cottonwood clonal plantation, would be hazardous if foresters did not have germ plasm banks available to draw upon.

Don't Worry About Tree Genes

If you are worried about losing parent material for some of our important tree species as efforts go forward to breed bigger and better trees, don't be. Foresters are taking the risks into account and assure us there will be no problem in the foreseeable future.

John C. Barber and Stanley L. Krugman, USDA Forest Service experts in forest genetics, give an account in the October issue of AMERICAN FORESTS magazine of what is being done to protect future forests.

Remembering the potato blight and famine of the 1840s, wheat rust, and the 1970 corn blight as problems resulting from narrowing the genetic base of the crop for a few specific traits, foresters in all parts of the United States are aware of the need to protect tree species for future generations.

Trees have a number of differences from farm crops that make them less susceptible to breeding hazards encountered in corn or potato fields. In contrast to agronomists, foresters work with essentially wild populations. With a few minor exceptions, they are not dealing with material selected over many generations. This means they still have wide genetic diversity available for the future. Only a limited amount of improved material is available, and none of it is far removed from the wild types. Even where intensive management will be practiced and large planting programs exist, only a small portion of the forest land will be involved over any large area. There will remain valuable reservoirs of native material.

Another advantage of forest trees is their longevity. No need to worry about depletion of the gene pool each year when the annual life cycle is complete.

A virtually unmodified gene pool will be provided into the far distant future by stands managed with a natural regeneration system. Also contributing to this pool will be other native stands such as primitive areas, wildernesses, research natural areas, parks, areas reserved for research, recreation and esthetic purposes, and stands unsuitable for economic harvesting. In the Eastern United States the large number of unmanaged woodlots will become a germ plasm reservoir.

From a practical viewpoint, the Forest Service scientists say there is no need for concern for major tree species of wide distribution, except to be aware of some risks of losing germ plasm from species with disjunct distributions, through influence of man or catastrophes such as fire or severe weather. Where these isolated stands may contain genetic diversity not present in the general population, the stands should be protected or some means provided for their continuation.

There is a need to identify these isolated stands of more widely distributed species and to identify species of limited distributions and to establish plantings to preserve these gene pools. But with the history of animal and crop breeders before them, the forest tree breeders are very conscious of potential risks in limiting the genetic base. They are taking the necessary steps to insure continued genetic diversity in forest tree species and its utilization in tree breeding.

Reprints of the AMERICAN FORESTS article are available from the Southern Forest Experiment Station, 701 Loyola Avenue, New Orleans, Louisiana 70113.

Hybrids in Harrison Experimental Forest in Mississippi.

Resin soaking is induced by applying paraquat to the trunk of a slash pine from which a strip of bark 1 inch high has been removed. (Jacksonville Journal photo)

Extending to the center of the tree, the resin-soaked wood will provide turpentine and rosin at a greatly increased rate when the harvested tree is processed. (Jacksonville Journal photo)

Process to Boost Turpentine Production Wins Award

A technique that may boost production of turpentine from pines five to tenfold over current levels has been selected by INDUSTRIAL RESEARCH magazine as one of the 100 most significant new technical processes of the year.

Developed by USDA Forest Service scientists at the Southeastern Forest Experiment Station in Olustee, Florida, the process involves applying an herbicide to the trunks of slash, longleaf, and loblolly pines so that wood of the living tree will become saturated with resin. Turpentine and rosin can then be extracted from this wood when the harvested tree is processed.

The research team at Olustee has discovered that resin soaking of wood can be induced in these southern pines by removing a small area of bark and spraying once with an 8-percent solution of paraquat, a herbicide commonly used to defoliate cotton and soybeans. The scientists estimate that if this solution is applied twice at 6-month intervals to one-third the tree circumference, two-thirds of the volume of the tree will become saturated with resin at least as high as 15 feet above the wounds.

Accepting the award for the Forest Service was Dr. John I. Zerbe, Director of Forest Products and Engineering Research in Washington, D. C. On hand to describe the new process was William J. Peters, a member of the research team in Olustee. Peters explained that the increased production of turpentine and other byproducts from resin-soaked wood has great potential for boosting the world's supply of critically needed chemicals by nonpolluting means. Peters emphasized, however, that further research is needed before the process is ready for commercial application and that paraquat must still be registered by the Federal Government for use on pines.

Home On The Range

Southern forest researchers appear at home on the range.

A bibliography dealing with the forest ranges of the South and with livestock and wildlife utilizing the resource has been issued by the Southern Forest Experiment Station in New Orleans. It lists over 950 publications and more than 1,040 authors.

The compilation is the third in a series by the Committee on Range Bibliography of the Southern Section of the Society for Range Management. It brings up to date coverage of publications useful to land managers, stockmen, conservationists, scientists, teachers, and students. The previous list had 650 entries and spanned the years 1962-1967. Most of the increase is attributed to wildlife research. The first bibliography appraised all literature that had accrued through 1961.

Because pasture commonly augments the diets of cattle that subsist chiefly on range forage, pertinent publications on supplemental pastures are included in the current listing. The southern range area extends from eastern Oklahoma to Virginia, and from southern Kentucky and Missouri to the Gulf of Mexico.

Title of the new publication is "Selected Bibliography on Southern Range Management, 1968-1972." Authors are H. A. Pearson, G. L. Wolters, C. E. Lewis, C. E. Probasco, researchers at the Southern, Southeastern, and North Central Forest Experiment Stations.

Copies are available from the Southern Forest Experiment Station, 701 Loyola Avenue, New Orleans, Louisiana 70113. Ask for Forest Service General Technical Report SO-3.

Southern pine forests yield much usable forage.

Isabel T. Duffy, who has edited FOREST RESEARCH NEWS since its first issue in 1968, has been promoted to a position with the Northeastern Forest Experiment Station, Upper Darby, Pennsylvania. She has been almost solely responsible for the form and content of the 25 issues to date, and several of her stories have won prizes.

Her successor has not been chosen, but future issues will be on schedule.

For information or photos on subjects in this issue, contact Public Information Officer, Southern Forest Experiment Station, 701 Loyola Avenue, New Orleans, Louisiana 70113.

Please note that our phone number has changed: it is now 504—589-3935.

Carpenterworm Literature Listed

Foresters, scientists, pest control personnel, and others who wish to refer to literature on the carpenterworm will find it all listed in a bibliography recently published by the Southern Forest Experiment Station of the USDA Forest Service.

The insect, the larvae of which cause severe economic loss by tunneling in the trunks of hardwood timber trees, is widely distributed through the United States and Canada. It is a native of North America. In the Eastern and Southern U. S. the oaks are its principal hosts. Here and elsewhere, however, green ash, black locust, elm, maple, willow, cottonwood, and occasionally fruit trees and ornamentals are attacked.

Over the years considerable literature has developed. Only in the past few decades has the carpenterworm's great importance in hardwood forest stands been recognized.

The present bibliography, compiled by J. D. Solomon of the Southern Station and C. J. Hay of the Northeastern Forest Experiment Station, is arranged in alphabetical order by author and is intended to cover all technical literature through 1972. Copies are available from the Southern Forest Experiment Station, 701 Loyola Avenue, New Orleans, Louisiana 70113. Ask for General Technical Report SO-4.

Control of Root Disease Pays

A USDA Forest Service scientist has demonstrated that the losses caused by annosus root rot can be controlled at a surprisingly low cost.

The fungus that causes the disease colonizes freshly cut stumps in plantations. Eventually, it spreads to the trees that are left after thinning through root contacts. Thus, a tree farmer who does not protect against the disease may find that his trees are dying at the very time when he hoped their growth would be fastest. After nurturing his plantation for 15 or 20 years, he may lose the trees just when they are starting to provide cash returns.

Annosus root rot can be controlled rather easily by applying granules of borax to freshly cut stumps. The tree feller can apply the borax in seconds. A time study by Charles S. Hodges, Jr., of the Southeastern Forest Experiment Station indicates that logging production is not slowed appreciably by having the feller treat stumps. Treatment costs, including chemical and labor, averaged 27 cents per cord of wood cut in the study.

Hodges does not recommend stump treatment for all plantations—just those where annosus root rot is most likely to strike. He says that deep, well-drained sandy soils are particularly favorable for the disease.

Details on costs and times of treatment were presented in a recent JOURNAL OF FORESTRY article. Copies of the article are available on request from the Southeastern Forest Experiment Station, P. O. Box 2570, Asheville, N. C. 28802.

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for growing pine all help to minimize consumption. Even when these techniques are applied, however, favoring pines over hardwoods costs something near 100,000 gallons of water per acre per year.

The water coming from forested watersheds is particularly valuable because of its exceptional purity. This pure water dilutes polluted water downstream and helps maintain a higher quality than would otherwise be possible.

On many sites in the South, pines are more efficient producers of wood than hardwoods. And pines are preferred over any other cover for rehabilitation of abused soils. Where water is plentiful, foresters can be expected to continue to favor pines over hardwoods. Where water is in short supply, however, foresters are going to have to consider very carefully before they plant pines.

Additional information about effects of timber cutting and pine planting on water production is available on request from the Southeastern Forest Experiment Station, P. O. Box 2570, Asheville, North Carolina 28802.

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equations, tables, and an explanation of their development are contained in Research Papers SO-96 (loblolly) and SO-97 (shortleaf), "Yield Tables and Stand Structure for Loblolly (Shortleaf) Pine Plantations in Tennessee, Alabama, and Georgia Highlands." Copies are available from the Southern Forest Experiment Station, 701 Loyola Avenue, New Orleans, Louisiana 70113.

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volume processed and number of plants. Now plywood from southern pine dominates the veneer industry in the South. These are some of the facts found in a new Southern Forest Experiment Station report, "Midsouth Veneer Industries, 1972," by Daniel F. Bertelson.

When the first southern pine plywood plant opened in 1963, only 2 percent of the Midsouth's veneer log output was pine. By 1969 more than 80 percent was pine, and in 1972 pine accounted for 93 percent of the region's veneer harvest.

The Midsouth supplied virtually all of the softwood veneer logs processed in the region. Production almost doubled between 1969 and 1972, and was 525 times greater in 1972 than in the original 1963 harvest.

Most of the pine veneer logs produced in the Midsouth are made into certified softwood plywood meeting designated nationwide commercial standards. The Nation's softwood plywood industry produced a record 18.3 billion square feet in 1972, and the Midsouth contributed more than one-fifth of this total.

The 42 pine plywood plants in the Midsouth processed about 49 million board feet each. The number of plants ranged from 13 in Louisiana to one in Oklahoma. Tennessee which is dominated by hardwood forests, is the only Midsouth State without a pine plywood plant.

Copies of the publication are available on request from the Southern Forest Experiment Station, 701 Loyola Avenue, New Orleans, Louisiana 70113. Ask for Forest Service Resource Bulletin SO-47.